



**State of New Hampshire**  
**RECOMMENDATIONS FOR THE**  
**PREVENTION AND CONTROL OF**  
**MULTIDRUG-RESISTANT ORGANISMS (MDROs)**

**Prepared by**  
New Hampshire Antibiotic Resistant Microorganisms (ARMs) Advisory Group  
New Hampshire Communicable Disease Epidemic Control Committee

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## ABBREVIATIONS USED IN THIS DOCUMENT

ARMs	Antimicrobial-Resistant Microorganisms
CDCS	NH DHHS, Communicable Disease Control Section
CDSS	NH DHHS, Communicable Disease Surveillance Section
CDC	U.S. Centers for Disease Control and Prevention
CDECC	NH Communicable Disease Epidemic Control Committee
CSTE	Council of State and Territorial Epidemiologists
DHHS	NH Department of Health and Human Services
DPHS	Division of Public Health Services
EPA	Environmental Protection Agency
ESBL	Extended-spectrum beta-lactamase-producing gram negative bacilli
GI	Gastrointestinal
GNB	Gram negative bacilli
GU	Genitourinary
HAI	Healthcare-associated Infection
HCW	Healthcare worker
ICP	Infection control professional
ICU	Intensive care unit
IV	Intravenous
LTCF	Long-term care facility
MDRO	Multidrug-Resistant Organism
MHD	Manchester Health Department
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
MSSA	Methicillin-susceptible <i>Staphylococcus aureus</i>
NH	New Hampshire
NH ICEP	NH Infection Control and Epidemiology Professionals
PHL	DHHS, Public Health Laboratories
PIO	DHHS, Public Information Office
PPE	Personal protective equipment
PRSP	Penicillin-resistant <i>Streptococcus pneumoniae</i>
SHEA	Society for Health Care Epidemiology of America
VISA	Vancomycin intermediate-resistant <i>Staphylococcus aureus</i>
VRE	Vancomycin-resistant <i>Enterococci</i>
VRSA	Vancomycin-resistant <i>Staphylococcus aureus</i>
WHO	World Health Organization

## INTRODUCTION

### Background

The emergence of multidrug-resistant organisms (MDROs) is increasingly recognized as a major public health threat. MDROs of clinical concern include methicillin-resistant *Staphylococcus aureus* (MRSA), *Staphylococcus aureus* with resistance to vancomycin (VISA/VRSA), vancomycin-resistant *Enterococci* (VRE), extended-spectrum beta-lactamase-producing gram-negative bacilli (ESBLs), and Penicillin-resistant *Streptococcus pneumoniae* (PRSP). The escalating prevalence of MDROs over the last two decades poses several problems:

- Patients and residents with infections caused by MDROs are more likely to require hospitalization, with increased costs and lengths of stay, and adversely affected prognoses;
- MDROs can spread to other patients and to health care workers;
- There is the potential transfer of resistance to other microorganisms.

MDROs are increasingly common in health care facilities. Studies have estimated that 48% of infections in hospital intensive care units (ICUs) are MRSA. Studies have also shown that more than 20% of long-term care facility (LTCF) residents may be colonized with MRSA, and more than 10% may be colonized with VRE. (1,2,3) In addition to MRSA and VRE, antibiotic-resistant gram-negative bacilli (GNB) are also common in these settings (e.g., *E. coli*, *Pseudomonas aeruginosa*, *Klebsiella* species). (4) In NH, MDROs have been identified in all health care settings and the general community.

MDROs are not limited to health care facilities. Community transmission has been well documented in recent years. Investigations have shown transmission among inmates, athletes, and even among those without risk factors. (5,6)

There are known risk factors for both colonization and infection of MDROs including:

- Severity of illness
- Previous exposure to antimicrobial agents
- Underlying disease or conditions, particularly
  - Chronic renal disease
  - Insulin-dependent diabetes mellitus
  - Immunodeficiency
  - Peripheral vascular disease
  - Wounds, dermatitis, or skin lesions
  - Decline in functional status
  - Invasive procedures such as
  - Dialysis
  - Presence of invasive devices
  - Urinary catheterization

- Repeated hospital admissions and other contacts with the health care system
- Previous colonization with a multidrug resistant organism
- Advanced age (>65)
- High patient-to-staff ratio
- Lack of attention to basic infection control measures

## **Purpose**

The purpose of this document is:

- To control MDROs in NH while maintaining quality of life for those patients/residents who are colonized or infected with MDROs;
- To assist NH health care professionals in making informed decisions within the context of their practice setting and given patient population;
- To facilitate patient movement across levels of care throughout the health care system.

## **Process**

An Antibiotic Resistant Microorganisms (ARMs) Advisory Group representing NH Infection Control and Epidemiology Professionals (NHICEP) from acute care, long-term care, and outpatient facilities worked collaboratively with the Communicable Disease Control Section (CDCS) to produce the first draft of this document to replace previously published State recommendations. Their first draft was reviewed and revised by the NH Communicable Disease Epidemic Control Committee (CDECC), which consists of representatives from the two local health departments, physicians specializing in infectious diseases and epidemiology, representatives from the NH Bureau of Emergency Management (NH BEM), the State and Deputy State Epidemiologists, other officials from DHHS, and partners such as the NH Hospital Association.

The final recommendations were modeled on Centers for Disease Control and Prevention (CDC) guidance, other State guidelines, and the Society for Healthcare Epidemiology of America (SHEA) Guidelines.<sup>(7)</sup> It is anticipated that this document may undergo periodic revisions as situations in the State change and as guidance from CDC is updated. It will be reviewed regularly by the NH CDECC and revised as appropriate.

## **Assumptions**

The development of the *NH Recommendations for the Prevention and Control of Multidrug-Resistant Organisms* was based on the following assumptions:

- There is evolving consensus regarding the best way to control MDROs, but there are also still controversies;



- Methods for identification of MDRO colonization and infection are imperfect, and those persons identified with an MDRO likely represent a small proportion of the total number of persons who have MDROs;
- Measures appropriate in outbreak settings may differ from those for non-outbreak settings. These recommendations focus on the latter;
- A consistent Statewide approach to MDRO control is desirable to improve adherence and reinforce patient/family confidence and adherence. There should be no fundamental differences in practice across the State and in different health care settings; and
- Reference to “patient” can be inferred to also be relevant for LTCF residents unless otherwise specified.

It is also assumed that every NH facility should have its own comprehensive approach to MDRO control according to the infection control and surveillance recommendations in this document. Such a comprehensive approach should also address topics that are not the emphasis of this document, such as:

- Strategy for institution of and adherence to the infection control measures described in this document;
- Education for health care workers (HCWs), staff, patients, and visitors;
- Local communication objectives and methods;
- Institutional antibiotic use guidelines to minimize unnecessary antibiotic use and mandate the appropriate use of vancomycin.(8,9)

## Definitions

**Carrier:** An individual who has been found to be colonized at one or more body sites but who has no signs or symptoms of infection.

**Cluster:** A closely grouped series of cases of a disease with well-defined distribution patterns in relation to time and/or place.

**Cohort:** A cohort consists of two or more patients sharing the same room in a facility and/or physically separated from other patients by their location.

**Cohort staffing:** The practice of assigning specified personnel to care only for patients known to be colonized or infected with MDROs

**Colonization:** The presence of microorganisms in or on a host with growth and multiplication but without tissue invasion or damage.

**Containment measures:** The separation of infected or exposed persons from non-infected persons by use of isolation, quarantine, or other restrictions on movement and activities.

**Decolonization therapy:** Topical and/or systemic antibiotic treatment administered for the purpose of eliminating carriage in an individual.

**Disinfection:** A process that kills or destroys nearly all microorganisms, with the exception of bacterial spores, on inanimate objects.

**Empiric:** Actions based on experience.

**Endemic:** A baseline rate or an ongoing frequency at which MDROs infection or colonization occurs in a facility.

**Epidemic:** An increase in the incidence of MDROs above its expected endemic level of occurrence in a given facility.

**Healthcare-Associated Infection:** An infection that develops in a patient who receives care in any setting where health care is delivered. This term is often used instead of nosocomial infection, because it encompasses healthcare settings other than the acute care setting.

**Healthcare worker:** Refers to any employee who has close contact of 1) patients (e.g., within 3 feet), 2) patient-care areas (e.g., patient rooms, procedure areas), or 3) patient-care items (e.g., linens and other waste).

**Immunocompetent:** The capacity for a normal immune response.

**Infection:** The invasion of bacteria into a body site, multiplying in tissue, and accompanied by clinical signs of illness such as fever, elevated white blood count, purulence (pus), pneumonia, and inflammation (warmth, redness, swelling). It may be documented by positive cultures such as blood, sputum, wound, or urine.

**Infection control measures:** Measures practiced by health care personnel in health care facilities to decrease the risk for transmission and acquisition of infectious agents through proper hand hygiene, scrupulous work practices, and use of personal protective equipment, such as masks, gloves, gowns, and eye protection. The types of infection control measures are based on how an infectious agent is transmitted and include standard, contact, droplet, and airborne precautions:

<http://www.cdc.gov/ncidod/hip/ISOLAT/Isolat.htm>.

- **Standard precautions:** Work practices required for the basic level of infection control. They center on proper hand hygiene, use of personal protective equipment (PPE), and appropriate handling of clinical waste:  
<http://www.cdc.gov/ncidod/hip/ISOLAT/isolat.htm>.(10)
- **Contact precautions:** Work practices designed to reduce the risk of transmitting infectious agents by direct or indirect contact with an infectious person. Direct contact transmission involves a direct body surface-to-body surface contact and physical transfer of infectious agents between an infected person and a susceptible host. Indirect-contact transmission involves contact of a susceptible host with a contaminated intermediate object, such as contaminated instruments or dressings or contaminated hands that are not washed or gloves that are not changed between patients. Contact precautions may also include the use of gloves and gowns for any interaction that may involve contact with the patient or patient's environment.
- **Droplet precautions:** Precautions designed to reduce the risk of droplet transmission of infectious agents. Droplet transmission occurs when droplets containing infectious agents generated by an infectious person are propelled a short distance through the air (e.g., by coughing, sneezing, or talking) and deposited on the conjunctivae or mucous membranes of the mouth or nose of a susceptible person. Droplet precautions include the use of a mask (not respirator) for close contact with the patient ( $\leq 3$  feet).

- **Airborne Infection Isolation (AII) precautions:** Precautions designed to reduce the risk of airborne transmission of infectious agents. Airborne transmission occurs by dissemination of nuclei of evaporated droplets that may remain suspended in the air for long periods of time. Microorganisms carried in this way can be dispersed by air currents and may be inhaled by a susceptible host in the same room or over a longer distance from the source patient, depending on environmental factors. An AII room that has negative pressure relative to the surrounding area is required for implementation of airborne precautions. Airborne precautions also include the use of a respirator.

**Isolation:** The separation of persons with a specific contagious illness from contact with susceptible persons and the restriction of their movement to reduce exposure to infected persons. Isolation may be used voluntarily or compelled by public health authorities and usually occurs in a hospital but can be in a home or dedicated isolation facility. See the CDC document, *Guidelines for Isolation in Hospitals*.(10)

**Line listing:** A database in which each row represents a case, usually a person with a disease, and each column contains information on variables relevant to the event being studied.

**Multidrug-resistant organisms:** Bacteria that are resistant to one or more classes of antimicrobial agents and usually are resistant to all but one or two commercially available antimicrobial agents. Common examples include MRSA, VISA/VRSA, VRE, ESBLs and PRSP (See list of abbreviations on page 6 & 7).

**Non-hospital health care setting:** Includes residential settings such as long-term care (nursing homes, assisted living facilities), skilled nursing facilities, hemodialysis centers, residential schools, psychiatric hospitals, and physicians' offices.

**Nosocomial Infection:** an infection resulting from an exposure to a source within an acute-care facility that was not incubating at the time of admission. It may occur in patients, personnel, or visitors. The term healthcare-associated infection is broader, to include infections that are transmitted in acute and non-acute healthcare settings.

**Outbreak:** An increase in the incidence of MDROs in the facility above the baseline level.

**Personal protective equipment (PPE):** Barrier protection to be used by an individual to prevent disease transmission. PPE may include gowns, gloves, masks, goggles, or face shields. The type of mask (e.g., surgical or N95) is disease-specific and defined in the type of precautions.

**Reservoir:** A person, animal, organism, or substance in which an infectious agent lives and multiplies (usually without damaging its host) that is a source of infection to a susceptible host.

**Risk factor:** A characteristic that is associated with an increased occurrence of disease or other health-related event.

**Surveillance:** The systematic collection, analysis, interpretation, and dissemination of data on an ongoing basis, to gain knowledge of the pattern of disease or event occurrence in a population in order to control and prevent disease in that population.

## Description of Clinically Relevant MDROs

MDRO	Agent	Reservoir	Mode of Transmission	Comments
MRSA	Methicillin-resistant <i>S. aureus</i>	++Colonized and infected patients +Colonized HCWs +Environment and fomites (11)	Patient-to-patient HCW hands environment?	Now endemic in most U.S. hospitals  Community-acquired MRSA may be unique  MRSA=MSSA in virulence
VISA VRSA	Vancomycin-(intermediate/resistant) <i>S. aureus</i>	As MRSA	As MRSA	8 confirmed cases of VISA and 2 cases of VRSA in U.S.  Prolonged vancomycin use is risk factor
VRE	Vancomycin-resistant <i>Enterococcus faecalis</i> or <i>faecium</i>	GI, GU, and environment	Patient-to-patient HCW hands environment	Often multi-resistant to penicillins and aminoglycosides
ESBL	Extended-spectrum Beta Lactamase-producing GNR	GI (12)  LTCF particular concern as reservoir for acute care facilities	Patient-to-patient HCW hands environment?	Important ESBL GNR include <i>Klebsiella</i> , <i>Pseudomonae</i> , <i>Serratia</i>
PRSP	Penicillin-resistant <i>S. pneumoniae</i>	Nasopharynx	Direct contact Droplet spread	PRSP also often resistant to erythromycin, trimethoprim - sulfamethoxazole, fluoroquinolones

## INFECTION CONTROL MEASURES FOR MDROs

### Key Concepts

- **Hand Hygiene:** The single most effective means of reducing the potential for MDRO transmission is hand hygiene, including the use of soap and water, and alcohol-based gels: (<http://www.cdc.gov/handhygiene>).(13)
- **Standard Precautions:** Every patient should be treated as potentially infectious, and treated with Standard Precautions: <http://www.cdc.gov/ncidod/hip/ISOLAT/isolat.htm>.(10)
- **Expanded Precautions:** Expanded Precautions (EP) are indicated in addition to Standard Precautions in some settings.

## **Priority Activities**

- Administrative Measures
- Patient Management
- Communication
- Education
- Outbreak Management

### **Administrative Measures**

Healthcare facilities can demonstrate a commitment to preventing transmission of infectious agents by incorporating infection control into the objectives of the organization's patient and occupational safety programs. Key administrative measures include:

- An infrastructure to guide, support, and monitor adherence to standard and expanded precautions
- Policies and procedures that explain how precautions will be applied and enforced
- Systems to identify and communicate information about patients with potentially transmissible infectious agents
- Systems for monitoring, assessment and correction of system failures that contribute to transmission
- Methods to provide feedback to healthcare personnel and senior administrators.

### **Patient Management**

Every facility should develop a plan for appropriate management of the MDRO-colonized or infected patient, which may include:

*Screening cultures:* Routine screening for MDROs (i.e., at admission) is **not recommended** by the New Hampshire Department of Health and Human Services or the CDC. Screening high-risk patients may be indicated in certain situations:

- Stool or rectal swab culture in patients with a history of VRE or contact with VRE patients;
- Nasal culture in patients with a history of MRSA or contact with MRSA patients;
- Infection site culture with directed susceptibility testing for VRSA/VISA in a patient with a history of extensive vancomycin use failing vancomycin therapy for MRSA;
- Patients with risk factors described on page 8.

## INFECTION CONTROL MEASURES FOR ALL PATIENTS:

Standard precautions, described in the table below, should be used at all times, regardless of known or suspected MDRO infection or colonization.

COMPONENT	RECOMMENDATIONS
Hand hygiene	After touching blood, body fluids, secretions, excretions, contaminated items; immediately after removing gloves; between patient contacts.
Personal protective equipment (PPE)	
Gloves	For touching blood, body fluids, secretions, excretions, contaminated items; for touching mucous membranes and non-intact skin.
Mask, eye protection, face shield	During procedures and patient-care activities likely to generate splashes of blood, body fluids, secretions.
Gown	During procedures and patient-care activities when contact of clothing/exposed skin with blood/body fluids, secretions, and excretions is anticipated.
Soiled patient-care equipment	Handle in a manner that prevents transfer of microorganisms to others and to the environment; wear gloves if visibly contaminated; perform hand hygiene.
Environmental control	Develop procedures for routine care, cleaning, and disinfection of environmental surfaces, especially frequently touched surfaces in patient-care areas.
Textiles and laundry	Handle in a manner that prevents transfer of microorganisms to others and to the environment.
Needles and other sharps	Do not recap, bend, break, or hand-manipulate used needles; if recapping is required, use a one-handed scoop technique only; use safety features when available; place used sharps in puncture-resistant container.
Patient resuscitation	Use mouthpiece, resuscitation bag and other ventilation devices to prevent contact with mouth and oral secretions.
Patient placement	Prioritize for single-patient room if patient is at increased risk of transmission, is likely to contaminate the environment, does not maintain appropriate hygiene, or is at increased risk of acquiring infection or developing adverse outcome following infection.
Respiratory hygiene/cough etiquette (source containment of infectious respiratory secretions in symptomatic patients, beginning at initial point of encounter e.g., triage and reception areas in emergency departments and physician offices)	Instruct symptomatic persons to cover mouth/nose when sneezing/coughing; use tissues and dispose in no-touch receptacle, observe hand hygiene after soiling of hands with respiratory secretions, wear surgical mask if tolerated or maintain spatial separation, >3 feet if possible.

## EXPANDED PRECAUTIONS

“Expanded Precautions” (EPs) is the term that replaces what used to be called “transmission-based precautions,” and refers to a package of healthcare work practices that are used in addition to Standard Precautions to prevent transmission when the route of transmission (e.g., contact, droplet, airborne) is not interrupted completely by Standard Precautions or when a protective environment is required to prevent an immunocompromised patient from an infection with environmental fungi. The four types of EPs include Contact, Droplet, Airborne Infection Isolation (AII), and Protective Environment (PE) Precautions. PE is not relevant to this document and will not be discussed further; the former three are described in greater detail in the Definitions section above.

- **Contact Precautions** reduce the risk of transmitting infectious agents by direct or indirect contact with an infectious person, and include:
  - Greater spatial separation of patients (single room or  $\geq 3$  feet between beds in multipatient rooms)
  - The use of gloves and gown by any healthcare personnel and visitors for all interactions that may involve contact with the patient or patient’s environment
  - Limiting transport and movement of patients outside of the room for medically necessary purposes
- **Droplet Precautions** reduce the risk of droplet transmission of infectious agents, and include
  - Single patient room in an acute care setting
  - The use of a surgical mask (not respirator) for close patient contact
  - Limiting transport and movement of patients outside of the room for medically necessary purposes
- **Airborne Infection Isolation (AII) Precautions** reduce the risk of airborne transmission of infectious agents. AII precautions require:
  - An AII room (with single occupancy) that has negative pressure relative to the surrounding area with closed door except for entry and exit
  - Fit-tested NIOSH-approved N95 respirator for health care personnel
  - Nose/mouth protection for rubeola and varicella
  - Limiting transport and movement of patients outside of the room to medically necessary purposes
    - If transport is necessary, patient should wear surgical mask (not N95) and all skin lesions should be covered

### **Syndromic Application and Discontinuation of Expanded Precautions:**

Certain clinical syndromes and conditions mandate the use of EPs, regardless of known or suspected infection or colonization with MDROs.

For example, contact precautions should be used for any patient who has:

- Wounds that cannot be covered fully or which have drainage that cannot be contained by dressings
- Excretion of urine or stool that cannot be contained in incontinence products or urine or ostomy bags

Droplet precautions should be used in addition to standard precautions when the patient has:

- Uncontained respiratory secretions
- Unexplained fever and cough (as part of CDC's Respiratory Etiquette and Cough Hygiene)
- Suspected bacterial meningitis

Contact and/or droplet precautions should be instituted when:

- MDRO infections have been epidemiologically linked to other patients or in outbreak situations

In general terms, EPs may be discontinued *and standard precautions continued* when the condition that prompted their application is resolved. For example:

- If wound drainage, incontinence, and/or respiratory secretions stop or can be contained
- No evidence that the patient has been implicated in patient-to-patient transmission of the target MDRO

### **Non-Syndromic Application and Discontinuation of Expanded Precautions:**

The identification of certain organisms should prompt EPs, regardless of their clinical syndrome. For example, it is widely accepted to use droplet precautions in response to identification of:

- *Bordetella pertussis*
- Influenza virus
- *Mycoplasma pneumonia*
- *Neisseria meningitidis*

It is advised to employ AII for:

- *Mycobacterium tuberculosis*
- Varicella-zoster virus
- Rubeola virus (measles)

The routine and automatic application of EPs in response to infection or colonization with MDROs is not recommended by the DHHS. However, infection control personnel in high-risk settings (e.g., acute care settings, burn and intensive care units) may independently decide that the identification of certain MDROs as epidemiologically significant, and institute EPs (usually contact precautions) in response to their identification, whether or not the patient meets the criteria for syndromic application of EPs (above). For example, many acute care settings implement contact precautions for all patients known to be infected or colonized with VRE. Any setting which adopts this practice should specify whether infection and/or colonization with MDROs is relevant, and should also adopt a clear policy for discontinuation of EPs.



When it is elected to discontinue EPs and *resume standard precautions* (usually in consultation with an infectious disease clinician and/or an infection control practitioner), this should be communicated clearly to the patient, family, and staff in the chart and by removal of advising signs.

### **Decolonization:**

Attempting decolonization of MDROs routinely is not recommended because:

- 1) Efficacy is questionable. For example, MRSA recolonization is common after treatment and there is no clinically proven decolonization regimen for VRE;
- 2) Attempts at decolonization may result in emergence of additional resistance to the agents used;
- 3) Decolonization has little impact on the long-term incidence of infections.(16,17,18)

There may be instances when attempted decolonization is appropriate, but should only be done on a case-by-case basis in consultation with physicians with expertise in infectious diseases/healthcare epidemiology

### ***Placement of a Patient with Known or Suspected MDRO:***

- A private room is always optimal;
- If a private room is not an option, cohort patients together who are infected or colonized with the *same* organism, but not infected or colonized with a different MDRO;
- If a private or cohort room is not an option, consider the cognitive and functional abilities of both the patient and the roommate:

<b>Colonized/Infected Patient Should:</b>	<b>Roommate Should:</b>
Have good hygiene	Be immunocompetent
Be cooperative	Be cooperative
Have drainage contained	Have no invasive devices (Foley, feeding tubes, trachs, drains)
	Have intact skin

### ***Patient Activities:***

- The movement, transport, and activities of **acute care** patients known to be infected or colonized with MDROs should be limited to essential purposes only;
- The movement, transport, and activities of patients in a **nonhospital health care setting** known to be infected or colonized with MDROs are different than those in acute care facilities because of more frequent group activities (including rehabilitation and treatment) and eating in a common dining room. The admission of persons with MDROs into LTCFs does not appear to increase infection rates among other residents (3,19,20) or result in excess morbidity or mortality.(1-3, 21) Routine isolation of ambulatory residents with MDROs would be contrary to the philosophy and policy of most of these facilities, and is **not** recommended. Restricting a resident's communal activities to reduce transmission

should be reserved for when a resident is shedding organisms into the environment OR has been implicated in transmission of infection to other residents.

- In either acute or nonhospital health care settings, when the patient is out of the room:
  - Consider the “3 C’s”. Ensure that the patient is *clean*, with drainage or secretions or excretions *contained* and is *cooperative* in any setting. Infected or colonized patients should be permitted to participate in activities if draining wounds are covered, bodily fluids are contained, and the patient observes good hygienic practices
  - Patients’ hands should be cleaned upon leaving the room and anytime they become contaminated while out of the room. Alcohol hand gel is exceptionally useful in such settings.

### ***Effective Environmental Cleaning:***

Standard facility procedures can be followed for cleaning patient rooms. Use of the Environmental Protection Agency (EPA) facility’s standard disinfectant is adequate.

- Although routinely used disinfectants are as active against VRE and MRSA as they are against MSSA, more thorough application of the disinfectant by "drenching the surface" or "active damp scrubbing" has been found to more reliably remove VRE from environmental surfaces in the health care setting than quick wiping with the cloth lightly sprayed with the same disinfectant;(22)
- Cleaning supplies should be dedicated to that room;
- Sharing of equipment (e.g., IV poles, cuffs, wheelchairs) should not be permitted unless disinfected between patients. When possible, items should be assigned to the person who is on contact precautions as long as the person requires the items, and then cleaned and disinfected prior to reuse by another patient.
- Shared items found in common areas should be cleaned on a regular basis with an EPA and facility-approved disinfectant.
- If a patient with an MDRO shares a bathroom with patients who are not infected and/or do not have the same MDRO, the bathroom should be cleaned and disinfected using standard facility procedures (e.g., daily and when visibly soiled);
- Commodes should be dedicated to one patient, but it is preferred that the infected/colonized patient use a toilet to reduce environmental contamination and exposure to infectious materials by health care workers;
- Showers, tubs, and whirlpools should be cleaned and disinfected between patient use, per standard facility procedure;
- Follow standard facility procedures for trash disposal per the NH Department of Environmental Services Waste Management Division. No additional or special handling is necessary;
- Standard precautions also apply for laundry. No additional or special handling is necessary;
- No special precautions are needed for dietary, food service, and eating utensils. The combination of hot water and detergents used in industrial dishwashers is sufficient to sanitize such items.

## **Setting-Specific Recommendations**

Although it has already been stated that a goal of these guidelines is to standardize the approach to control of MDROs across the State, regardless of health care setting or whether colonization or infection, there are several specific concerns likely to be unique according to setting.

- **Home Health Care and Hospice Settings:** Home health care workers should focus on preventing cross transmission via their clinical bag, clothing and equipment that is carried to and from the patient's home. This can be accomplished by adhering to Standard Precautions and using disposable items or by cleaning or bagging reusable equipment prior to leaving the patient's home. Good hand hygiene is the most efficient way to prevent the spread of disease.
- **Ambulatory Care Settings – Clinics, Physician Offices, Rehabilitation, Dialysis Centers:** Patients with overt signs and symptoms of infection should spend as little time as possible in common waiting areas. Any surfaces that may have been in contact with the patient (e.g., blood pressure cuffs, examination table, stethoscopes) should be cleaned with an EPA- and facility-approved disinfectant prior to use for another patient. In dialysis facilities, dialyze the patient identified with an MDRO at a station with as few adjacent stations as possible, e.g., at the end or corner of the unit. The room and equipment used for these patients can be cleaned using the same procedures for all patients in accordance with Standard Precautions.
- **Non-Health Care Settings – Schools, Retirement Centers, and Day Care Centers:** Hand hygiene should be emphasized.
- **Home Settings:** The patients colonized or infected with MDROs require no special control measures beyond regularly cleaning all surfaces contaminated by secretions, excretions, or touched by contaminated hands. Family members should inform health care facilities or providers of the patients' prior colonization or infection with MDROs. Inform the patient and family of the importance of prompt cleaning and disinfection of bathrooms and other environmental surfaces that may become contaminated with secretions, excretions, or fecal matter. Explain standard precautions and the use of gloves when handling secretions and excretions and hand antisepsis during and after care for family and patient. Members that are immunosuppressed or very ill should not have contact with secretions/excretions and should promptly wash their hands if they have contact with a person with MDROs. No special procedures are necessary for home laundry. Health care workers who visit the home should be advised of MDROs status.
- **Medical transport:** Standard precautions and usual vehicle cleaning routines are adequate to transport patients with MDROs.

## **Communication**

- **Within the facility:** *Each facility should establish a system of flagging medical and electronic records of colonized or infected individuals* so that all staff involved in care are notified prior to transfer and appropriate infection control protocols/precautions can be put in place. Identifying persons at the time of readmission to the facility can assist the admissions department and nursing personnel to implement special precautions promptly.

This measure requires some indication in the patient's medical record and/or computer file, which is accessed at the time of admission. Any such system must maintain patient confidentiality.

- **With other facilities:** Effective communication between facilities involved in patient transfer is important to ensure that the MDROs status of the patient is known and that appropriate precautions are instituted and maintained in both facilities. *It is the responsibility of the facility transferring the patient to inform the receiving unit/facility and the ambulance or transfer personnel of the patient's colonization or infection history and status prior to treatment or transfer.* When a patient is found to be infected or colonized with MDROs within 48 hours of admission, the receiving facility should inform the transferring institution. **Persons with MDROs should NOT be denied hospital and/or long-term care facility admission solely on the basis of a positive MDROs culture.**(16,23)

### **Education**

- **Staff education:** Continuing education programs for staff who have direct contact with patients or items in their environment is strongly encouraged. Staff who are responsible for making decisions regarding the care and placement of patients should also receive information about MDROs. It is important that health care workers who have direct contact with patients on contact precautions be made aware of appropriate control measures (e.g., protective garments/barriers) prior to room entry. Ideally, such education should be part of orientation and ongoing, regular education.
- **Patient, family, and visitor education:** Patients, families, and visitors should be educated about MDROs and necessary precautions. For example, patients should be instructed to cover their mouths when coughing, to practice good hand hygiene, and to not share drinks, food, or personal items, like razors or nail clippers. Patients on isolation and their families need additional education, including the reason for isolation, control measures, and expected duration of isolation. Family and visitors need to comply with precautions – hand washing when entering and leaving the room, use of gowns and gloves, and their proper removal. Family members should be advised that healthy members have little risk of developing an infection due to MDROs

**Activities for the NH DHHS will include:**

- Encourage education and training for relevant health care providers
- Update recommendations as appropriate
- Advise regarding any changes to the Reportable Disease List (currently, VRE, VRSA, and “any unusual occurrence or cluster of illness which may pose a threat to the public’s health” are included, but this List is subject to review and change).

**MDRO Outbreak Management****Key Concepts**

The primary goals of outbreak management are to:

- Control and prevent further disease
- Identify factors that contributed to the outbreak
- Develop and implement measures to prevent further outbreaks in the future

**Priority Activities**

When a cluster or outbreak is identified, the CDCS should be notified as soon as possible. Working in conjunction with the CDCS, an action plan can be developed to:

- Initiate and maintain a line listing
- Search for unidentified cases
- Reinforce infection control practices
- Cohort patients/staff
- Keep ill staff home until well
- Educate health care workers
- Treat infections appropriately
- Clean and disinfect the environment and equipment

**MDRO SURVEILLANCE****Key Concepts**

Surveillance is an important epidemiological component of all infection control programs, in order to:

- Establish baseline rates of MDRO infections in a facility and identify higher than endemic rates, clusters, or an outbreak.
- Use culture and sensitivity data to provide information on antimicrobial sensitivity and resistance patterns in a facility or community. Communicating this information can help

guide physicians in the selection of the most appropriate empiric treatment before culture and sensitivity results are known.

- Prioritize and focus infection control program activities.
- Develop specific educational tools to reinforce infection control practices.

### **Priority Activities**

Surveillance should include the regular review of all microbiology culture and sensitivity data to detect MRSA, VRE, and other locally defined epidemiologically important organisms.

- As part of a surveillance program, a confidential line listing of MDRO-infected and colonized cases should be maintained. It should be noted whether cases were acquired in the facility, another facility, or the community. This information may be used to establish a baseline or endemic rate for the facility.
- Surveillance is a useful adjunct to control the spread of epidemiologically significant antibiotic-resistant pathogens. (7)
  - Consensus has not been reached to recommend obtaining routine, active surveillance cultures in all settings. However, in certain settings, i.e., burn units and intensive care units (ICUs), it may serve a role.
  - Surveillance cultures are a snapshot, as body flora is ever changing. Therefore, surveillance cultures are not warranted unless there is reason to suspect an infection or possible source of dissemination of MDROs.
  - Health care personnel should be cultured only if epidemiologic data implicates them as a possible source.
  - If continual cross-transmission occurs or an outbreak is recognized, additional surveillance techniques are warranted. It may be appropriate in these situations to culture employees, patients, or the environment.
- **Routine screening cultures for patients (i.e., on admission) is not recommended by the NH DHHS, although other authorities encourage this practice for VRE (SHEA).**

## REFERENCES

1. Bradley, S.F., Terpenning, M.S., Ramesy, M.A., et al. Methicillin-Resistant *Staphylococcus aureus*: Colonization and Infection in a Long-Term Care Facility. *Ann Intern Med.* 1991; 115:417-422.
2. Strausbaugh, L.J., Jacobson, C., Sewell, D.L., et al. Methicillin-Resistant *Staphylococcus aureus* in Extended-Care Facilities. *Infect Control Hosp Epidemiol.* 1991; 12:36-45.
3. Bonilla, H.F., Zervos, M.A., Lyons, M.J., et al. Colonization with Vancomycin-Resistant *Enterococcus faecium*: Comparison of a Long-Term-Care Facility with an Acute Care Hospital. *Infect Control Hosp Epidemiol.* 1997; 18:333-339.
4. Bradley, S.F. Issues in the Management of Resistant Bacteria in Long-Term-Care Facilities. *Infect Control Hosp Epidemiol.* 1999; 20:362-366.
5. CDC. Methicillin-Resistant *Staphylococcus aureus* Infections Among Competitive Sports Participants--Colorado, Indiana, Pennsylvania, and Los Angeles County, 2000-2003. *MMWR* 2003; 52(33):793-795.
6. CDC. Methicillin-Resistant *Staphylococcus aureus* Infections in Correctional Facilities--Georgia, California and Texas, 2001-2003. *MMWR* 2003;52(41):992-996.
7. Muto, C.A., Jernigan, J.A., Ostrowsky, B.E., Richet, H.M., Jarvis, W.R., Boyce, J. M., Farr, B. M. SHEA Guideline for Preventing Nosocomial Transmission of Multidrug-Resistant Strains of *Staphylococcus aureus* and Enterococcus. *Infect Control Hosp Epidemiol.* 2003; 24:362-386.
8. Nicolle, L.E., Bentley, D., Garibaldi, R., et al. SHEA Position Paper: Antimicrobial Use in Long-Term-Care Facilities. *Infect Control Hosp Epidemiol.* 2000; 21:534-545.
9. Hospital Infection Control Practices Advisory Committee (HICPAC). Recommendations for Preventing the Spread of Vancomycin Resistance: Recommendation of the Hospital Infection Control Practices Advisory Committee. *Am J Infect Control.* 1995; 23:87-94 and also in *MMWR* 1995; 44 (RR-12):1-13.
10. Garner, Julia S., and the Hospital Infection Control Practices Advisory Committee. Guideline for Isolation Precautions in Hospitals. *AJIC.* 1996; 24:24-52. Also available at: <http://www.cdc.gov/ncidod/hip/ISOLAT/Isolat.htm>
11. Muto, C.A., M.D., M.S., et al. SHEA Guideline for Preventing Nosocomial Transmission of Multidrug -Resistant Strains of *Staphylococcus aureus* and Enterococcus. *Infect Control Hosp Epidemiol.* 2003;24:367.
12. Quinn, J.P., Clinical Significance of extended-spectrum beta-lactamases. *Eur J Clin Microbiol Infect Dis.* 1994; 13: 39-42 (Suppl 1)
13. Centers for Disease Control and Prevention. Guideline for Hand Hygiene in Health-Care Settings. Recommendations of the Health Care Infection Control Practices Advisory

Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *MMWR* 2002;(51) No. RR-16. <http://www.cdc.gov/handhygiene>

14. Lindsay E. N., World Health Organization. Infection Control Programmes to Contain Antimicrobial Resistance. Available at:  
<http://www.google.com/u/who?q=esbl&site=who.int&domains=who.int>.  
Accessed 10 February 2004.
15. Ministry of Health Malaysia, Consensus Guidelines for the Management of Infections by ESBL – Producing Bacteria. Available at:  
[http://www.acadmed.org.my/cpg/infections\\_by\\_esbl\\_producing\\_bacteria.pdf](http://www.acadmed.org.my/cpg/infections_by_esbl_producing_bacteria.pdf).  
Accessed 10 February 2004.
16. Strausbaugh, L.J., Crossley, K.B., Nurse, B.A., et al. SHEA Position Paper: Antimicrobial Resistance in Long-Term-Care Facilities. *Infect Control Hosp Epidemiol*. 1996; 17:129-140.
17. Boyce, J.M., Jackson, M.M., Pugliese, G., et al. Methicillin-Resistant *Staphylococcus aureus* (MRSA): A Briefing for Acute Care Hospitals and Nursing Facilities. *Infect Control Hosp Epidemiol*. 1994; 15:105-115.
18. Strausbaugh, L.J., Jacobson, C., Sewell, D.L., et al. Antimicrobial Therapy for Methicillin-Resistant *Staphylococcus aureus* Colonization in Residents and Staff of a Veterans Affairs Nursing Home Care Unit. *Infect Control Hosp Epidemiol*. 1992;13:151-159.
19. Boyce, J.M. Methicillin-Resistant *Staphylococcus aureus*. Detection, Epidemiology and Control Measures. *Infect Dis Clin North Am*. 1989; 3:901-913.
20. Hsu, C.C.S. Serial Survey of Methicillin-Resistant *Staphylococcus aureus* Nasal Carriage Among Residents in a Nursing Home. *Infect Control Hosp Epidemiol*. 1991; 12:416-421.
21. Spindle, S.J. Strausbaugh, L.J., Jacobson, C. Infections Caused by *Staphylococcus aureus* in a Veterans Affairs Nursing Home Care Unit: A Five Year Experience. *Infect Control Hosp Epidemiol*. 1995; 16:217-223.
22. Muto, C.A., et al. SHEA Guideline for Preventing Nosocomial Transmission of Multidrug-Resistant Strains of *Staphylococcus aureus* and *Enterococcus*. *Infect Control Hosp Epidemiol*. 2003; 24:374.
23. *J Am Geriatric Soc*. 2000; 48(10):1211-5.